

AMENDMENTS TO THE DRAWINGS

The attached three Replacement sheets of drawings includes changes to Figure 3 indicated in the corresponding attached Annotated Sheet of Figure 3. Specifically, Figure 3 has been revised to include an indication of tanks 7, 9 and 10. No new matter has been added.

Attachment: 3 Replacement Sheet(s)
3 Annotated Sheet Showing Changes

REMARKS

Reconsideration is requested.

The specification text and figures have been revised in response to the objection to the drawings. No new matter has been added. Withdrawal of the objection to the drawings is requested.

The Section 103 rejection of claims 1-7 over Bhattacharyya (U.S. Patent No. 7,029,571) is traversed. Reconsideration and withdrawal of the rejection are requested in view of the following distinguishing comments.

The applicant submits that the claimed invention is not taught or suggested by the cited patent and it is believed that the patent fails to teach or suggest, for example, the flow process, the principle, the production objective and/or the realization process of the present invention.

Specifically, the cited patent is understood to disclose a process of catalytic cracking of multiple riser for producing high yield of middle distillates, i.e. the middle distillates of C8 to C24. The claims require only two risers to achieve the recited aim.

However the present invention explicitly discloses a catalytic cracking process with three risers, thereby achieving the different production aims and satisfying the different requirements: for example increasing the yield of total liquid and simultaneously realizing upgrading of catalytic gasoline, and obtaining high quality of gasoline and diesel oil while producing more low olefins. The applicants believe that it took nearly 40 years to develop the catalytic cracking process of the conventional riser to the catalytic cracking process of the current two risers, which required scientific effort. The researchers have achieved the catalytic cracking process of the current two risers

by optimizing the structure and size of riser reactor and the operating conditions, based on the full recognition of the disadvantages of the conventional riser.

The applicants believe that any suggestion of the cited patent that the combination of three riser reactors may be deduced from the process of two risers is not practical and/or reasonable, because a great deal of research must also be done to develop two riser process to three riser process. Only after a great deal of research, a researcher can determine how to arrange the third riser reactor and the regeneration system in terms of reaction time, type of catalyst and type of reactor in order to achieve the desired higher yield of light oil and simultaneously improve the quality of product and produce more low olefins. The comparative data between the two risers and the three risers and the effect were originally disclosed in the specification. The advantages of the present invention are submitted to be evidence of unobviousness and unexpected results.

The applicants believe that it would not have been obvious to have developed the claimed invention from the catalytic cracking process of the two risers. Moreover, the process parameters are not believed to be consistent between the cited patent and the present invention in that the patent is understood to disclose that the contact period of oil and gas is 1 to 8 seconds, the riser top temperature is 400 to 525°C and the catalyst to oil ratio is 2 to 12. It is impractical and very difficult to carry out the operating conditions of the patent which varies in so large a scope to achieve the same production aim, i.e. producing more middle distillates in terms of the reaction principle of catalytic cracking.

The present invention provides a process of catalytic cracking based on the full recognition of the disadvantages of the current conventional riser, and upgrades catalytic gasoline or produces more low olefins while achieving the higher yield of total liquid. Therefore the contact time of oil and gas in the three riser of the claims is specified. The contact time of oil and gas in the first and second risers is about 1 second, which is obtained based on full experimental research and the simulated calculation of the riser reactor. The yield of light oil reaches the maximum after 1 second of reaction. If the reaction time in the first riser is too long, the conversion depth is too deep, which results in the yield of dry gas and burned coke is increased while the yield of diesel oil is reduced. If the reaction time is too short, the conversion depth is not enough, which will not results in the desired product. Whereas in the third riser, the contact time of oil and gas varies depending on the experimental results, the production aim and the flow process.

Moreover, the applicants believe that the flow process of the present claims would not have been obvious in view of the cited patent. The patent discloses a reaction-regeneration system containing two riser reactors, wherein a fraction of unconverted heavy oil and cycle oil of greater than 370°C is further cracked in order to produce more middle distillates. A catalytic cracking process of three risers and the method to achieve the process or the flow are not mentioned or suggested.

The present claims describe a catalytic cracking process of three risers and three flow processes to achieve different production aims. Furthermore, the ascending form and the descending form may be used for the third riser in accordance with the different production aims.

Further, the use of the catalyst is also different between the process of the cited patent and the present invention. The cited patent discloses an ultra-stable zeolite catalyst for cracking heavy oil and is not believed to mention or suggest other functional catalysts.

The presently claimed invention is able to use conventional catalyst is in the first and second risers, while different functional catalysts are used in accordance with the different production aims in the reaction-regeneration system of the third riser, for example the catalyst for reducing olefins or producing more low olefins are used. In terms of the recycle of catalyst therefore, the first and second risers commonly use one set of recycle system of catalyst, while the third riser solely uses its own reaction-regeneration catalyst recycle system.

The cited patent is understood to only disclose a process for olefin-reduction modification of catalytic oil with high content of olefins by using the second riser. The process, the principle and the production aim of the cited patent are understood to be different from the presently claimed invention.

The presently claimed invention would not have been obvious from the cited art as the applicants believe that the flow process, the optimizing of operating conditions, the structure of the reactor, the control of reaction time and/or the choice of catalyst are all different and distinct.

Specifically, for example, with regard to the flow process, the first and second risers commonly use one set of reaction-regeneration system, while the third riser has its own sole reaction-regeneration system to carry out different production embodiment and production aim. The present invention explicitly discloses a catalytic cracking

process of three risers and three flow processes to achieve different production aims.

With regard to operating conditions and control of reaction time, the present invention discloses different operating conditions and reaction time, especially control of reaction time in accordance with different production aims. With regard to the structure type of reactor, the first and second risers use an ascending reactor, while the third riser may use ascending or descending reactor in accordance with production aims. Finally, with regard to the catalyst, the first and second risers use the conventional cracking catalysts and functional additives, while different functional catalysts are used in accordance with the different production aims in the third riser, for example the catalyst for reducing olefins or producing more low olefins are used.

In summary, the applicants believe the cited patent fails to suggest the claimed invention and that the ordinarily skilled person in the art would not have had a reasonable expectation of success in making and/or using the claimed invention from the cited patent.

The claims are submitted to be in condition for allowance and a Notice to that effect is requested. The Examiner is requested to contact the undersigned in the event anything further is required in this regard.

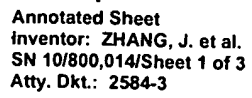
ZHANG, J. et al.
Appl. No. 10/800,014
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Respectfully submitted,

NIXON & VANDERHYE P.C.

By: /B. J. Sadoff/
 B. J. Sadoff
 Reg. No. 36,663

BJS:
901 North Glebe Road, 11th Floor
Arlington, VA 22203-1808
Telephone: (703) 816-4000
Facsimile: (703) 816-4100



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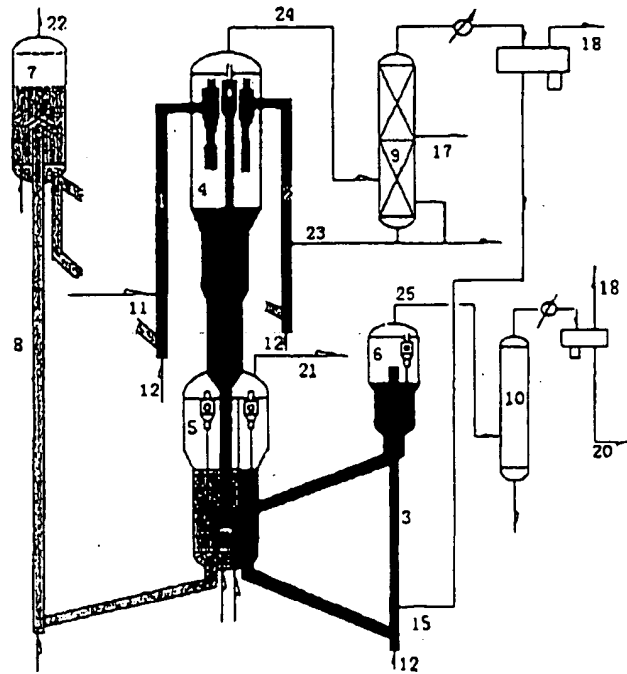


FIGURE 2

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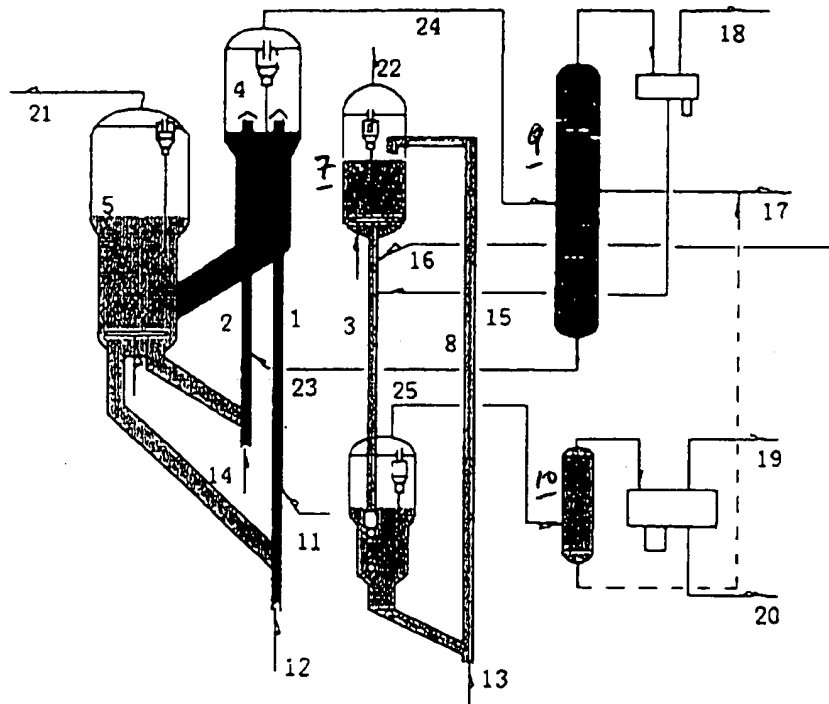


FIGURE 3